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Evolution of the Equatorial Pacific during the Pliocene: an East-West record

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The Equatorial Pacific (EP) was affected by two major events during the Pliocene: the closure of the Central American Seaway (CAS) and the intensification of the Northern Hemisphere glaciation (NHG). The EP evolves from an open area to an East-West system, characterized by a strong asymmetry of the thermocline depth, productivity and sea surface temperatures (SSTs).
Changes in the equatorial Pacific during the Pliocene are here illustrated by using samples from the IODP Site 1338 in the Eastern Equatorial pacific (EEP), and from the ODP Site 806 in the Western Equatorial pacific (WEP). In order to compare the evolution of the East-West transect, we present on both sites oxygen stable isotopes record of bulk carbonate (δ18Obulk), calcareous nannofossils dominated fractions (δ18ONoelaerhabdaceae) which are assumed to live in the photic zone, and of the planktonic foraminifera Globoratalia menardii (δ18OG. menardii), thermocline dweller. Results are combined with alkenone-derived SST for the site 1338 (Rousselle et al., EPSL, 2012) and 806 (Pagani et al., Nature Geosciences, 2010).
A decoupling in δ18Obulk and δ18OG. menardii evolution records can be observed from 4.5 Ma between both sites. This segregation in the thermocline layer between the East and the West is more clearly identifiable from $\sim$ 3.8 Ma in δ18OG. menardii and show a cooling in the East and a warming of the thermocline waters in the West. This suggest the setting of the Western Pacific Warm Pool (WPWP), and thereby the Equatorial asymmetric pattern. This is in agreement with an establishment of the Eastern Equatorial Cold Tongue (EECT) between 4.4 and 3.6 Ma accompanying a cooling of the SSTs.
The divergence between the δ18Obulk and δ18OG. menardii records become stronger from 2.7 Ma, and may suggest the beginnings of a La Niña time period. However, as the δ18O records in the EEP (bulk, G. menardii, Noelaerhabdaceae) show heavy values and a progressive cooling of 3°C, the WEP experienced warm temperature ($\sim$ 28°C) and more negative δ18O values.
The Warm Pool is a priori installed in the WEP, with a stronger local influence than the global cooling linked to the NHG intensification, yet which affect the EEP and increase the cooling related to the thermocline shoaling.